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## PATENT ABSTRACTS OF JAPAN

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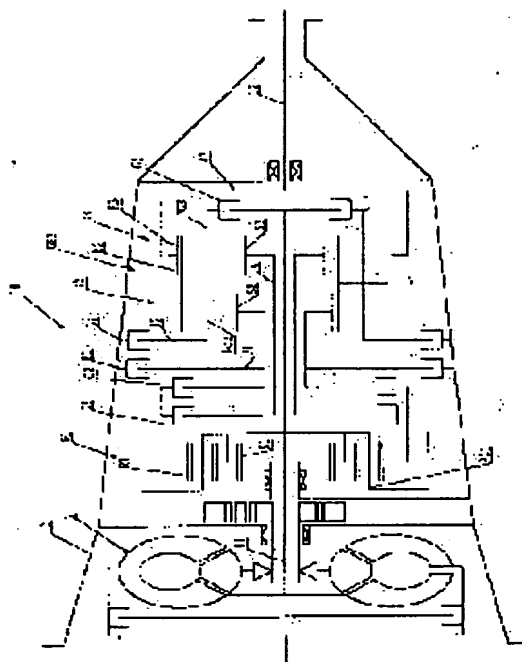
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## (54) TRANSMISSION

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a transmission having the six steps or more of a forward transmission gear ratio, in which a backward transmission gear ratio can be designed appropriately, without having to increase the number of revolutions of the pinion at a high-speed gear ratio of transmission gear ratio.

**SOLUTION:** A transmission 10 is provided with a first planetary gear G1; a Ravigneaux gear unit G23 for connecting ring gears R2 and R3, and carriers PC2 and PC3, for also having first to fourth shaft elements J1 to J4, for further connecting the third shaft element J3 with a output shaft 12 a first friction clutch element C1 which is possible to connect the ring gear R1 and the fourth shaft element J4 a second friction clutch element C2 which can be connected to the ring gear R1 and the first shaft element J1, a third friction clutch element C3 which can be connected a input shaft 11 and the second shaft element J2, a first friction brake element B1 which is possible to fix the first shaft element J1, and a second friction brake element B2 which is possible to fix the second shaft element J2.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] An input shaft, an output shaft, and the double pinion planetary gear of the 1st train which connected the carrier with said input shaft, While connecting the ring wheel of the single pinion planetary gear of the 2nd train, and the ring wheel of the double pinion planetary gear of the 3rd train, the carrier of the single pinion planetary gear of said 2nd train and the carrier of the double pinion planetary gear of said 3rd train are connected. The 1st axial element connected with the sun gear of the single pinion planetary gear of said 2nd train, The 2nd axial element connected with the carrier of the double pinion planetary gear of said 3rd train, The 3rd axial element connected with the ring wheel of the single pinion planetary gear of said 3rd train, The 4th axial element connected with the sun gear of the double pinion planetary gear of said 3rd train, The RABINIYO type gear unit which was made to possess and connected said 3rd axial element with said output shaft, The 1st friction clutch element C1 for connecting alternatively the ring wheel of the double pinion planetary gear of said 1st train, and said 4th axial element of said RABINIYO type gear unit, The 2nd friction clutch element C2 for connecting alternatively the ring wheel of the double pinion planetary gear of said 1st train, and said 1st axial element of said RABINIYO type gear unit, The 3rd friction clutch element C3 for connecting alternatively said input shaft and said 2nd axial element of said RABINIYO type gear unit, A change gear equipped with 2nd friction brake element B-2 for fixing alternatively the 1st friction brake element B1 for fixing alternatively said 1st axial element of said RABINIYO type gear unit, and said 2nd axial element of said RABINIYO type gear unit.

[Claim 2] The change gear of claim 2 characterized by having the 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of said 1st train, and said 1st axial element of said RABINIYO type gear unit.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the change gear used for the automatic gear of an automobile about a change gear.

[0002]

[Description of the Prior Art] There is a technique indicated by JP,6-323381,A as a conventional change gear. Three planetary-gear units are arranged at a serial, and each planetary-gear unit uses one ring wheel, the carrier, and the sun gear for this official report, respectively. These gears are used and the change gear which can switch six advance gear stages and one go-astern gear stage is indicated through five engagement elements (two clutches and three brakes) driven by external force.

[0003]

[Problem(s) to be Solved by the Invention] However, when the change gear indicated by the above-mentioned official report is designed so that a pinion rotational frequency in case a gear ratio is the 5th speed or 6 \*\* may not become large, junior gear ratio becomes large and it has the problem that the degree of freedom of a design is low.

[0004] Then, this invention makes it a technical technical problem to offer the change gear of six or more steps of advance which can design junior gear ratio appropriately using the planetary gear of three trains that the above-mentioned trouble should be solved, without a gear ratio enlarging the pinion rotational frequency at the time of high-speed stages, such as the 5th speed or 6 \*\*.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem invention of claim 1 An input shaft, an output shaft, and the double pinion planetary gear of the 1st train which connected the carrier with the input shaft, While connecting the ring wheel of the single pinion planetary gear of the 2nd train, and the ring wheel of the double pinion planetary gear of the 3rd train, the carrier of the single pinion planetary gear of the 2nd train and the carrier of the double pinion planetary gear of the 3rd train are connected. The 1st axial element connected with the sun gear of the single pinion planetary gear of the 2nd train, The 2nd axial element connected with the carrier of the double pinion planetary gear of the 3rd train, The 3rd axial element connected with the ring wheel of the single pinion planetary gear of the 3rd train, The 4th axial element connected with the sun gear of the double pinion planetary gear of the 3rd train, The RABINIYO type gear unit which was made to possess and connected the 3rd axial element with the output shaft, The 1st friction clutch element C1 for connecting alternatively the ring wheel of the double pinion planetary gear of the 1st train, and the 4th axial element of a RABINIYO type gear unit, The 2nd friction clutch element C2 for connecting alternatively the ring wheel of the double pinion planetary gear of the 1st train, and the 1st axial element of a RABINIYO type gear unit, The 3rd friction clutch element C3 for connecting alternatively an input shaft and the 2nd axial element of a RABINIYO type gear unit, It considered as the change gear equipped with 2nd friction brake element B-2 for fixing alternatively the 1st friction brake element B1 for fixing alternatively the 1st axial element of a RABINIYO type gear unit, and the 2nd axial element of a RABINIYO type gear unit.

[0006] The change gear of six steps of advance which can design junior gear ratio appropriately, and one step of go-astern can be constituted without enlarging a pinion rotational frequency in case a gear ratio is the 5th speed or 6 \*\* according to claim 2. Furthermore, according to claim 2, it becomes possible to take out the running torque of an input shaft through the carrier of the double pinion planetary gear of the 1st train, and the change gear equipped with the power-take-off equipment of the car which needs power in addition to the transit purposes, such as a dump truck, a concrete mixer truck, and a motor fire engine, can be offered.

Furthermore, since the planetary gear of the 1st train are double pinion planetary gear, the degree of freedom of a setup of the number of teeth of a sun gear and a ring wheel improves, and the degree of freedom of a setup of gear ratio improves in connection with this.

[0007] Invention of claim 2 is equipped with the 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of the 1st train, and the 1st axial element of a RABINIYO type gear unit in the change gear of claim 1.

[0008] According to claim 2, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element only by having added the friction clutch element C4 to the change gear of the configuration of claim 1, and setting a friction engagement element to six.

[0009]

[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing. The gestalt of this operation explains the case where it uses for the automatic gear of an automobile.

[0010] Drawing 1 is the schematic diagram showing the gear train of the change gear 10 in the gestalt of operation of the 1st of this invention. A change gear 10 is arranged in housing 1, and outputs the output from the torque converter 2 which outputs the output of the engine which is not illustrated to a change gear 10 through the shearing force of a viscous medium to the axle which carries out an increase moderation change and which is not illustrated to advance 6 \*\* and the go-astern 1st speed according to the change of a friction engagement element.

[0011] The input shaft 11 whose change gear 10 is the output shaft of a torque converter 2, The double pinion planetary gear G1 (the 1st planetary gear G1 are called hereafter) of the 1st train which has the carrier PC 1 connected with the output shaft 12 connected with an axle through the differential gear which is not illustrated, and an input shaft 11, The ring wheel R2 of the single pinion planetary gear (the 2nd planetary gear G2 are called hereafter) of the 2nd train, and the double pinion planetary gear of the 3rd train While connecting the ring wheel R3 of (calling 3rd planetary-gear G3 hereafter), the carrier PC 2 of the 2nd planetary gear G2 and the carrier PC 3 of 3rd planetary-gear G3 are connected. The 1st axial element J1 connected with the sun gear S2 of the 2nd planetary gear G2, The 2nd axial element J2 connected with the carrier PC 3 of 3rd planetary-gear G3, The 3rd axial element J3 connected with the ring wheel R3 of 3rd planetary-gear G3, The 4th axial element J4 connected with the sun gear S3 of 3rd planetary-gear G3, The RABINIYO type gear unit G23 which was made to possess and connected the 3rd axial element J3 with the output shaft 12, The 1st friction clutch element C1 which connects alternatively the ring wheel R1 of the 1st planetary gear G1, and the 4th axial element J4 of the RABINIYO type gear unit G23, The 2nd friction clutch element C2 which connects alternatively the ring wheel R1 of the 1st planetary gear G1, and the 1st axial element J1 of the RABINIYO type gear unit G23, The 3rd friction clutch element C3 for connecting alternatively an input shaft 11 and the 2nd axial element J2 of the RABINIYO type gear unit G23, It has 2nd friction brake element B-2 which fixes alternatively the 1st friction brake element B1 which fixes alternatively the 1st axial element J1 of the RABINIYO type gear unit G23, and the 2nd axial element J2 of the RABINIYO type gear unit G23.

[0012] in the 1st planetary gear G1, it is [ at number-of-teeth = 0.375 of the number of teeth / ring wheel R1 of the rho1= sun gear S1, and the 2nd planetary gear G2 ] number-of-teeth = 0.375 of the number of teeth / ring wheel R3 of the rho3= sun gear S3 in number-of-teeth = 0.5 of the number of teeth / ring wheel R2 of the rho2= sun gear S2, and 3rd planetary-gear G3.

[0013] The combination and gear ratio of each engagement element in the gestalt of the 1st operation are shown in Table 1.

[0014]

[Table 1]

	C 1	C 2	C 3	B 1	B 2	ギヤ比
1 速	○				○	4. 2 6 7
2 速	○			○		2. 4 8 9
3 速	○	○				1. 6 0 0
4 速	○		○			1. 1 6 4
5 速		○	○			0. 8 4 2
6 速			○			0. 6 6 7
R e v		○			○	3. 2 0 0

In addition, in Table 1, O shows an engagement condition and the blank shows the open condition.

[0015] The change of the gear ratio in Table 1 is explained. In the 1st speed, while transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 to the 4th axial element J4 of the RABINIYO type gear unit G23, moderation rotation of the 3rd axial element J3 is carried out by fixing the 2nd axial element J2 of the RABINIYO type gear unit G23 in 2nd friction brake element B-2, and the 1st speed is formed.

[0016] In the 2nd speed, while transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 to the 4th axial element J4 of the RABINIYO type gear unit G23, moderation rotation of the 3rd axial element J3 is carried out by fixing the 1st axial element J1 of the RABINIYO type gear unit G23 with the 1st friction brake element B1, and the 2nd speed is formed.

[0017] While transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 in the 3rd speed to the 4th axial element J4 of the RABINIYO type gear unit G23 The RABINIYO type gear unit G23 a ring wheel R1 and really rotates by transmitting the output of the ring wheel R1 which the 2nd friction clutch element C2 was engaged [ ring wheel ], and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, and moderation rotation of the 3rd axial element J3 is carried out. The 3rd speed is formed.

[0018] While transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 in the 4th speed to the 4th axial element J4 of the RABINIYO type gear unit G23 Moderation rotation of the 3rd axial element J3 is carried out by the 3rd friction clutch element C3 being engaged, and transmitting the torque of an input shaft 11 to the 2nd axial element J2 of the RABINIYO type gear unit G23, and the 4th speed is formed.

[0019] While transmitting the output of the ring wheel R1 which was engaged in the 2nd friction clutch element C2, and increased the torque of an input shaft 11 in the 5th speed to the 1st axial element J1 of the RABINIYO type gear unit G23 By transmitting the torque of an input shaft 11 to the 2nd axial element J2 of the RABINIYO type gear unit G23 by engagement of the 3rd friction clutch element C3, accelerating rotation is carried out and the 3rd axial element J3 forms the 5th speed which is an overdrive.

[0020] At 6 \*\*, while the 3rd friction clutch element C3 is engaged and transmitting the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, by fixing the 2nd axial element J2 of the RABINIYO type gear unit G23 in 2nd friction brake element B-2, accelerating rotation is carried out and the 3rd axial element J3 forms 6 \*\* which are overdrives.

[0021] In go-astern (Rev), while transmitting the output of the ring wheel R1 which was engaged in the 2nd friction clutch element C2, and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, inverse rotation of the 3rd axial element J3 is carried out by fixing the 2nd axial element J2 of the RABINIYO type gear unit G23 in 2nd friction brake element B-2, and go-astern is formed.

[0022] By B-2, as mentioned above, an undershirt drive, the 5th speed, and 6 \*\* can constitute the planetary gear G1 and G2 of three trains, and G3 and five friction engagement elements C1, C2, C3, and B1 from switching each friction engagement element, and the 4th speed can constitute the change gear 10 of advance 6 \*\* of an overdrive, and the go-astern 1st speed from the 1st speed. Furthermore, it becomes possible to take out the running torque of an input shaft 11 through the carrier PC 1 of the 1st planetary gear G1, and the change gear equipped with the power-take-off equipment of the car which needs power in addition to the transit purposes, such as a dump truck, a concrete mixer truck, and a motor fire engine, can be offered.

[0023] Next, the change gear 20 in the gestalt of operation of the 2nd of this invention is explained. Drawing 3 is the schematic diagram showing the gear train of the change gear 20 in the gestalt of the 3rd operation.

[0024] The change gear 20 of the gestalt of the 3rd operation is equipped with the 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of the 1st train, and the 1st axial element of the RABINIYO type gear unit G23 to the change gear 10 of the gestalt of the 1st operation mentioned above, and since it is the same as that of the gestalt of the 1st operation about the other configuration, it omits explanation. In addition, it is the same as that of a change gear 10 also about the gear ratio  $\rho_{01}$ ,  $\rho_{02}$ , and  $\rho_{03}$  of each planetary gear.

[0025] The combination and gear ratio of each engagement element in the gestalt of the 2nd operation are shown in Table 2.

[0026]

[Table 2]

	C 1	C 2	C 3	C 4	B 1	B 2	ギヤ比
1 速	○					○	4. 2 6 7
2 速	○				○		2. 4 8 9
3 速	○	○					1. 6 0 0
4 速	○			○			1. 3 1 8
5 速	○		○				1. 1 6 4
6 速			○	○			1. 0 0 0
7 速		○	○				0. 8 4 2
8 速			○		○		0. 6 6 7
R e v 1		○				○	3. 2 0 0
R e v 2				○		○	2. 0 0 0

In addition, in Table 2, O shows an engagement condition and the blank shows the open condition.

[0027] The change of the gear ratio in Table 2 is explained. In the 1st speed, while transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 to the 4th axial element J4 of the RABINIYO type gear unit G23, moderation rotation of the 3rd axial element J3 is carried out by fixing the 2nd axial element J2 of the RABINIYO type gear unit G23 in 2nd friction brake element B-2, and the 1st speed is formed.

[0028] In the 2nd speed, while transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 to the 4th axial element J4 of the RABINIYO type gear unit G23, moderation rotation of the 3rd axial element J3 is carried out by fixing the 1st axial element J1 of the RABINIYO type gear unit G23 with the 1st friction brake element B1, and the 2nd speed is formed.

[0029] While transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 in the 3rd speed to the 4th axial element J4 of the RABINIYO type gear unit G23 The RABINIYO type gear unit G23 a carrier PC 1 and really rotates by transmitting the output of the carrier PC 1 which the 2nd friction clutch element C2 was engaged [ carrier ], and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, and moderation rotation of the 3rd axial element J3 is carried out. The 3rd speed is formed.

[0030] While transmitting the output of the ring wheel R1 which was engaged, carried out the 1st friction clutch element C1 in the 4th speed, and increased the torque of an input shaft 11 to the 4th axial element J4 of the RABINIYO type gear unit G23 Moderation rotation of the 3rd axial element J3 is carried out by the 4th friction clutch element C4 being engaged, and transmitting the torque of an input shaft to the 1st axial element J1 of the RABINIYO type gear unit G23, and the 4th speed is formed.

[0031] While transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 in the 5th speed to the 4th axial element J4 of the RABINIYO type gear unit G23 Moderation rotation of the 3rd axial element J3 is carried out by the 3rd friction clutch element C3 being engaged, and transmitting the torque of an input shaft 11 to the 2nd axial element J2 of the RABINIYO type gear unit G23, and the 5th speed is formed.

[0032] In 6 \*\*, while the 4th friction clutch element C4 is engaged and transmitting the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, the RABINIYO type gear unit G23 really rotates by the 3rd friction clutch element C3 being engaged, and transmitting the torque of an input shaft 11 to the 2nd axial element, and 6 \*\* are formed.

[0033] While the 3rd friction clutch element C3 is engaged and transmitting the torque of an input shaft 11

to the 2nd axial element J2 of the RABINIYO type gear unit G23 in 7 \*\*. The 3rd axial element J3 carries out accelerating rotation by transmitting the output of the ring wheel R1 which was engaged in the 2nd friction clutch element C2, and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, and 7 \*\* are formed.

[0034] In 8 \*\*, while the 3rd friction clutch element C3 is engaged and transmitting the torque of an input shaft 11 to the 2nd axial element J2 of the RABINIYO type gear unit G23, the 3rd axial element J3 carries out accelerating rotation by fixing the 1st axial element J1 with the 1st friction brake element B1, and 8 \*\* are formed.

[0035] In the go-astern 1st speed, while transmitting the output of the ring wheel R1 which was engaged in the 2nd friction clutch element C2, and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, the 3rd axial element J3 carries out inverse rotation by fixing the 2nd axial element J2 in 2nd friction brake element B-2, and the go-astern 1st speed is formed.

[0036] In the go-astern 2nd speed, while the 4th friction clutch element C4 is engaged and transmitting the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, the 3rd axial element J3 carries out inverse rotation by fixing the 2nd axial element J2 in 2nd friction brake element B-2, and the go-astern 2nd speed is formed.

[0037] As mentioned above, an undershirt drive, 7 \*\*, and 8 \*\* can constitute [ 6 \*\* ] the change gear 20 of advance 8 \*\* of an overdrive, and the go-astern 2nd speed from the 1st speed only with the configuration which added the 4th friction clutch element C4 to the change gear 10 shown with the gestalt of the 1st operation.

[0038] As mentioned above, although the gestalt of operation of this invention was explained, as long as the intention limited to the gestalt of the operation which mentioned this invention above is the change gear of a gestalt which there is not and met the main point of this invention, it may be what kind of gestalt.

[0039]

[Effect of the Invention] The change gear of six steps of advance which can design junior gear ratio appropriately, and one step of go-astern can be constituted without enlarging a pinion rotational frequency in case a gear ratio is the 5th speed or 6 \*\* according to claim 1. Furthermore, it becomes possible to take out the running torque of an input shaft through the carrier of the double pinion planetary gear of the 1st train, and the change gear equipped with the power-take-off equipment of the car which needs power in addition to the transit purposes, such as a dump truck, a concrete mixer truck, and a motor fire engine, can be offered. Furthermore, since the planetary gear of the 1st train are double pinion planetary gear, the degree of freedom of a setup of the number of teeth of a sun gear and a ring wheel improves, and the degree of freedom of a setup of gear ratio improves in connection with this.

[0040] According to claim 2, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element only by having added the friction clutch element C4 to the change gear of the configuration of claim 1, and setting a friction engagement element to six.

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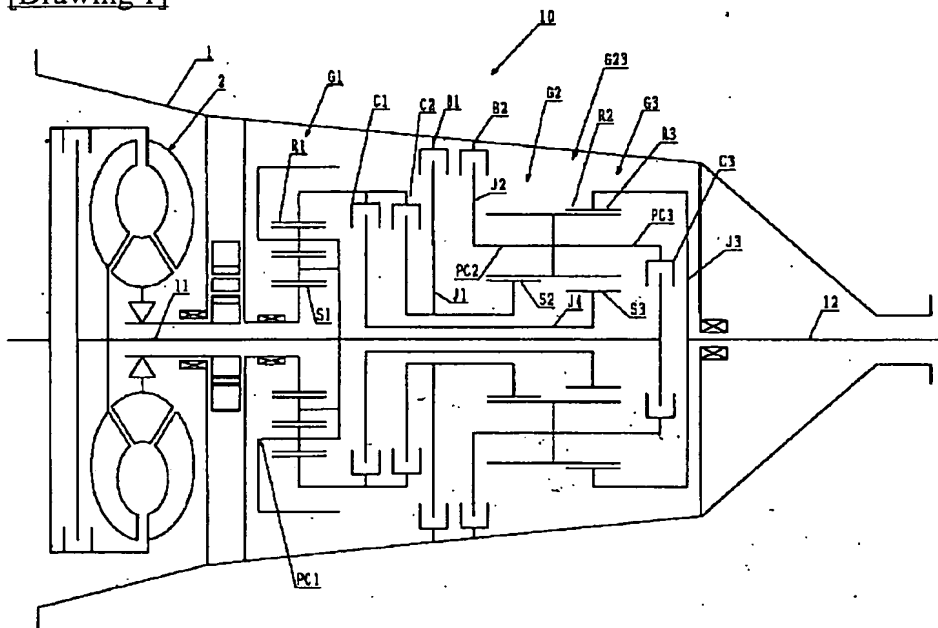
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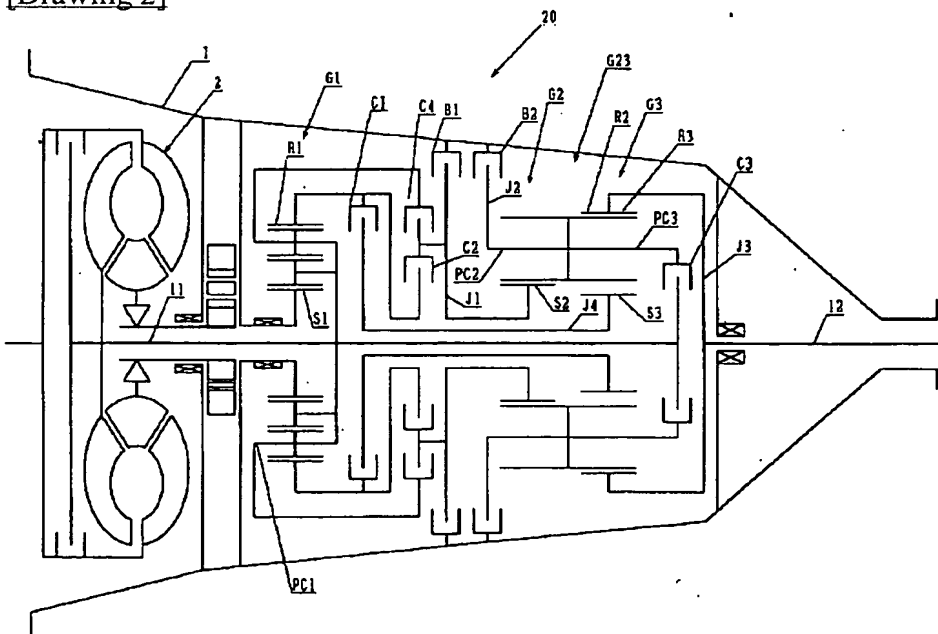
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## DRAWINGS

[Drawing 1]



[Drawing 2]





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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law  
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 F16H 3/62 A

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 [Procedure amendment 1]  
 [Document to be Amended] Specification  
 [Item(s) to be Amended] Claim  
 [Method of Amendment] Modification  
 [The contents of amendment]

[Claim(s)]

[Claim 1]

Input shaft,

Output shaft,

Double pinion planetary gear of the 1st train which connected the carrier with said input shaft,  
 While connecting the ring wheel of the single pinion planetary gear of the 2nd train, and the ring wheel of the double pinion planetary gear of the 3rd train, the carrier of the single pinion planetary gear of said 2nd train and the carrier of the double pinion planetary gear of said 3rd train are connected. The 1st axial element connected with the sun gear of the single pinion planetary gear of said 2nd train, The 2nd axial element connected with the carrier of the double pinion planetary gear of said 3rd train, The RABINIYO type gear unit which was made to possess the 3rd axial element connected with the ring wheel of the single pinion planetary gear of said 3rd train, and the 4th axial element connected with the sun gear of the double pinion planetary gear of said 3rd train, and connected said 3rd axial element with said output shaft,  
 The 1st friction clutch element C1 for connecting alternatively the ring wheel of the double pinion planetary gear of said 1st train, and said 4th axial element of said RABINIYO type gear unit,  
 The 2nd friction clutch element C2 for connecting alternatively the ring wheel of the double pinion planetary gear of said 1st train, and said 1st axial element of said RABINIYO type gear unit,  
 The 3rd friction clutch element C3 for connecting alternatively said input shaft and said 2nd axial element of said RABINIYO type gear unit,  
 The 1st friction brake element B1 for fixing alternatively said 1st axial element of said RABINIYO type gear unit,

2nd friction brake element B-2 for fixing alternatively said 2nd axial element of said RABINIYO type gear unit,

The 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of said 1st train, and said 1st axial element of said RABINIYO type gear unit,

Preparation \*\*\*\*\*.

[Claim 2]

Said change gear,

Said 2nd friction brake element B-2 is engaged with said 1st friction clutch element C1, and the advance 1st speed is constituted,

Said 1st friction clutch element C1 and said 1st friction brake element B1 are engaged, and the advance 2nd speed is constituted,

Said 1st friction clutch element C1 and said 2nd friction clutch element C2 are engaged, and the advance 3rd speed is constituted,

Said 1st friction clutch element C1 and said 4th friction clutch element C4 are engaged, and the advance 4th speed is constituted,

Said 1st friction clutch element C1 and said 3rd friction clutch element C3 are engaged, and the advance 5th speed is constituted,

Said 3rd friction clutch element C3 and said 4th friction clutch element C4 are engaged, and advance 6 \*\* is constituted,

Said 2nd friction clutch element C2 and said 3rd friction clutch element C3 are engaged, and advance 7 \*\* is constituted,

Said 2nd friction clutch element C3 and said 1st friction brake element B1 are engaged, and advance 8 \*\* is constituted,

The change gear of claim 1 which constitutes the gear ratio of advance 8 speed gear.

[Claim 3]

Said change gear,

Any 1 change gear of claim 1 which engages said 2nd friction brake element B-2 with said 2nd friction clutch element C2, and constitutes the 1st \*\*\*\*\*, or claim 2.

[Claim 4]

Said change gear,

The change gear of claim 3 which engages said 2nd friction brake element B-2 with said 4th friction clutch element C4, and constitutes the 2nd \*\*\*\*\* of small gear ratio from gear ratio of said 1st \*\*\*\*\*.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0005

[Method of Amendment] Modification

[The contents of amendment]

[0005]

[Means for Solving the Problem]

In order to solve the above-mentioned technical problem invention of claim 1 An input shaft, an output shaft, and the double pinion planetary gear of the 1st train which connected the carrier with the input shaft, While connecting the ring wheel of the single pinion planetary gear of the 2nd train, and the ring wheel of the double pinion planetary gear of the 3rd train, the carrier of the single pinion planetary gear of the 2nd train and the carrier of the double pinion planetary gear of the 3rd train are connected. The 1st axial element connected with the sun gear of the single pinion planetary gear of the 2nd train, The 2nd axial element connected with the carrier of the double pinion planetary gear of the 3rd train, The 3rd axial element connected with the ring wheel of the single pinion planetary gear of the 3rd train, The 4th axial element connected with the sun gear of the double pinion planetary gear of the 3rd train, The RABINIYO type gear unit which was made to possess and connected the 3rd axial element with the output shaft, The 1st friction clutch element C1 for connecting alternatively the ring wheel of the double pinion planetary gear of the 1st train, and the 4th axial element of a RABINIYO type gear unit, The 2nd friction clutch element C2 for connecting alternatively the ring wheel of the double pinion planetary gear of the 1st train, and the 1st axial element of a RABINIYO type gear unit, The 3rd friction clutch element C3 for connecting alternatively an input shaft and the 2nd axial element of a RABINIYO type gear unit, The 1st friction brake element B1 for fixing alternatively the 1st axial element of a RABINIYO type gear unit, 2nd friction brake element B-2 for fixing alternatively the 2nd axial element of a RABINIYO type gear unit, It considered as the change gear

equipped with the 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of the 1st train, and the 1st axial element of a RABINIYO type gear unit.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0006

[Method of Amendment] Modification

[The contents of amendment]

[0006]

According to claim 1, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element only by setting a friction engagement element to six. Furthermore, according to claim 1, it becomes possible to take out the running torque of an input shaft through the carrier of the double pinion planetary gear of the 1st train, and the change gear equipped with the power-take-off equipment of the car which needs power in addition to the transit purposes, such as a dump truck, a concrete mixer truck, and a motor fire engine, can be offered. Furthermore, since the planetary gear of the 1st train are double pinion planetary gear, the degree of freedom of a setup of the number of teeth of a sun gear and a ring wheel improves, and the degree of freedom of a setup of gear ratio improves in connection with this.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0007

[Method of Amendment] Modification

[The contents of amendment]

[0007]

In the change gear of claim 1, invention of claim 2 thru/or claim 4 engages 2nd friction brake element B-2 with the 1st friction clutch element C1, and constitutes the advance 1st speed. The 1st friction clutch element C1 and the 1st friction brake element B1 are engaged, and the advance 2nd speed is constituted. The 1st friction clutch element C1 and the 2nd friction clutch element C2 are engaged, and the advance 3rd speed is constituted. The 1st friction clutch element C1 and the 4th friction clutch element C4 are engaged, and the advance 4th speed is constituted. The 1st friction clutch element C1 and the 3rd friction clutch element C3 are engaged, and the advance 5th speed is constituted. The 3rd friction clutch element C3 and the 4th friction clutch element C4 are engaged, and advance 6 \*\* is constituted. While engaging the 2nd friction clutch element C2 and the 3rd friction clutch element C3, constituting advance 7 \*\*, engaging the 2nd friction clutch element C3 and the 1st friction brake element B1, constituting advance 8 \*\* and constituting the gear ratio of advance 8 speed gear 2nd friction brake element B-2 is engaged with the 2nd friction clutch element C2, the 1st \*\*\*\*\* is constituted, 2nd friction brake element B-2 is engaged with the 4th friction clutch element C4, and the 2nd \*\*\*\*\* of small gear ratio consists of gear ratio of the 1st \*\*\*\*\*.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0008

[Method of Amendment] Modification

[The contents of amendment]

[0008]

According to claim 2 thru/or claim 4, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element of the change gear of claim 1.

[Procedure amendment 6]

[Document to be Amended] Specification

[Item(s) to be Amended] 0024

[Method of Amendment] Modification

[The contents of amendment]

[0024]

The change gear 20 of the gestalt of the 2nd operation is equipped with the 4th friction clutch element C4 for connecting alternatively the carrier of the double pinion planetary gear of the 1st train, and the 1st axial element of the RABINIYO type gear unit G23 to the change gear 10 of the gestalt of the 1st operation mentioned above, and since it is the same as that of the gestalt of the 1st operation about the other

configuration, it omits explanation. In addition, it is the same as that of a change gear 10 also about the gear ratio  $\rho_1$ ,  $\rho_2$ , and  $\rho_3$  of each planetary gear.

[Procedure amendment 7]

[Document to be Amended] Specification

[Item(s) to be Amended] 0029

[Method of Amendment] Modification

[The contents of amendment]

[0029]

While transmitting the output of the ring wheel R1 which was engaged in the 1st friction clutch element C1, and increased the torque of an input shaft 11 in the 3rd speed to the 4th axial element J4 of the RABINIYO type gear unit G23 The RABINIYO type gear unit G23 a carrier PC 1 and really rotates by transmitting the output of the ring wheel R1 which the 2nd friction clutch element C2 was engaged [ ring wheel ], and increased the torque of an input shaft 11 to the 1st axial element J1 of the RABINIYO type gear unit G23, and moderation rotation of the 3rd axial element J3 is carried out. The 3rd speed is formed.

[Procedure amendment 8]

[Document to be Amended] Specification

[Item(s) to be Amended] 0039

[Method of Amendment] Modification

[The contents of amendment]

[0039]

[Effect of the Invention]

According to claim 1, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element only by setting a friction engagement element to six. Furthermore, it becomes possible to take out the running torque of an input shaft through the carrier of the double pinion planetary gear of the 1st train, and the change gear equipped with the power-take-off equipment of the car which needs power in addition to the transit purposes, such as a dump truck, a concrete mixer truck, and a motor fire engine, can be offered. Furthermore, since the planetary gear of the 1st train are double pinion planetary gear, the degree of freedom of a setup of the number of teeth of a sun gear and a ring wheel improves, and the degree of freedom of a setup of gear ratio improves in connection with this.

[Procedure amendment 9]

[Document to be Amended] Specification

[Item(s) to be Amended] 0040

[Method of Amendment] Modification

[The contents of amendment]

[0040]

According to claim 2 thru/or claim 4, it enables an undershirt drive, 7 \*\*, and 8 \*\* for 6 \*\* to offer the change gear of eight steps of advance of an overdrive, and two steps of go-astern from the 1st speed with the combination of each friction engagement element of the change gear of claim 1.

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[Translation done.]